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I. STATUS OF CLAIMS

Claims 1-45 were pending for examination at the time of the office action.

Claims 21-40 stand rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement. See Office Action, p. 9-10 (13 February, 2009).

Claims 21-40 stand rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement. See Office Action, p. 10-11 (13 February, 2009).

Claims 12, 13, 21-40, 32, 33, and 43 stand rejected under 35 USC §112, second paragraph, as failing to failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. See Office Action, p. 12-14 (13 February, 2009).

Claims 1, 12, 14, 15, 18-21, 32, 34, 35, 38-42, 44 and 45 stand rejected under 35 USC §103(a) as being anticipated by Mulgund et al (US 2002/0161751 A1) in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. See Office Action, p. 14-21 (13 February, 2009).

Claims 2 and 22 stand rejected under 35 USC §103(a) as being anticipated by Mulgund et al. in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. and in further view of Chiloyan et al. (US Patent No.: 7,165,109). See Office Action, p. 21 (13 February, 2009).

Claims 3-6 and 23-26 stand rejected under 35 USC §103(a) as being anticipated by Mulgund et al. in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. and in further view of Godlewski (US Patent No.: 6,421,354). See Office Action, p. 21-23 (13 February, 2009).

Claims 7-11, 13, 27-31, 33, and 43 stand rejected under 35 USC §103(a) as being anticipated by Mulgund et al. in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. and in further view of "The Design of an Acquisitional Query Processor For Sensor Networks" by Samuel Madden et al. See Office Action, p. 23-26 (13 February, 2009).

Claims 16, 17, 36, and 37 are rejected under 35 USC §103(a) as being anticipated by Mulgund et al. in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. and in further view of Kung et al. (US 2005/0021724 A1). See Office Action, p. 27-28 (13 February, 2009).

Claims 2, 11, 21, 27, 29-40 and 42 have been amended, and Claims 46-50 are added.

Claims 1-50 are pending for examination.

II. ISSUES TO BE REVIEWED

The issues in this response relate to whether the art of record establishes a *prima facie* case of anticipation of Applicant's Claims 1-50, and whether the art of record establishes a *prima facie* case of unpatentability of Applicant's Claims 1-50. For reasons set forth elsewhere herein, Applicant respectfully asserts that the art of record does not establish a *prima facie* case of anticipation or unpatentability of any pending claim. Accordingly, Applicant respectfully requests that Examiner hold all pending Claims 1-50 allowable for at least the reasons described herein, and issue a Notice of Allowance on same.

III. ARGUMENT: ART OF RECORD DOES NOT ESTABLISH *PRIMA FACIE* CASE OF UNPATENTABILITY IN VIEW OF CITED ART OF RECORD

Applicant respectfully asserts herein that, under the MPEP and legal standards for patentability as set forth below, the art of record does not establish a *prima facie* case of the unpatentability of Applicant's claims at issue. Specifically, Applicant respectfully shows below that the art of record does not recite the text of Applicant's claims at issue, and hence fails to establish a *prima facie* case of unpatentability. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejections and hold all claims to be allowable over the art of record.

A. MPEP Standards for Patentability[1]

The MPEP states as follows: "the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant. . . If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent." *MPEP* § 2107 (citing *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992)); *In Re Glaug*, 283 F.3d 1335, 62 USPQ2d 1151 (Fed. Cir. 2002) ("During patent examination the PTO bears the initial burden of presenting a *prima facie* case of unpatentability. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 252 U.S.P.Q. 785, 788 (Fed. Cir. 1984). If the PTO fails to meet this burden, then the applicant is entitled to the patent."). Accordingly, unless and until an examiner presents evidence establishing *prima facie* unpatentability, an applicant is entitled to a patent on all claims presented for examination.

1. MPEP Standards for Determining Anticipation

An examiner bears the initial burden of factually supporting any *prima facie* conclusion of anticipation. *Ex Parte Skinner*, 2 U.S.P.Q.2d 1788, 1788-89 (B.P.A.I. 1986); *In Re King*, 801 F.2d 1324, 521 U.S.P.Q. (BNA) 136 (Fed. Cir. 1986); *MPEP* § 2107 (citing *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992) ("[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability....")). Failure of an examiner to meet this burden entitles an applicant to a patent. *Id.* ("[i]f examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent").

The MPEP indicates that in order for an examiner to establish a *prima facie* case of anticipation of an applicant's claim, the examiner must first interpret the claim,[2] and

[1] Applicant is aware that Examiner is familiar with the MPEP standards. Applicant is merely setting forth the MPEP standards to serve as a framework for Applicant's arguments following and to ensure a complete written record is established. Should Examiner disagree with Applicant's characterization of the MPEP standards, Applicant respectfully requests correction.

thereafter show that the cited prior art discloses the same elements, in the same arrangement, as the elements of the claim which the examiner asserts is anticipated. More specifically, the MPEP states that "[a] claim is anticipated *only if each and every element as set forth in the claim is found*, either expressly or inherently described, in a single prior art reference. . . . The identical invention must be shown in as complete detail as is contained in the . . . claim. . . . The elements must be arranged as required by the claim . . . ." *MPEP* § 2131 (emphasis added). Consequently, under the guidelines of the MPEP set forth above, if there is *any* substantial difference between the prior art cited by an examiner and an applicant's claim which the examiner asserts is rendered anticipated by the prior art, the prior art does NOT establish a *prima facie* case of anticipation and, barring other rejections, the applicant is entitled to a patent on such claim.

2. MPEP Standards for Determining Obviousness

"[T]he examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness."[3] *MPEP* § 2142. The MPEP indicates that in order for an examiner to establish a *prima facie* case that an invention, as defined by a claim at issue, is obvious, the examiner must (1) interpret the claim at issue; (2) define one or more prior art reference components relevant to the claim at issue; (3) ascertain the differences between the one or more prior art reference components and the elements of the claim at issue; and (4) adduce objective evidence which establishes, under a preponderance of the evidence standard, a teaching to modify the teachings of the prior art reference components such that the prior art reference components can be used to construct a device substantially equivalent to the claim at issue. This last step generally encompasses

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[2] With respect to interpreting a claim at issue, the MPEP directs that, during examination -- as opposed to subsequent to issue -- such claim be interpreted as broadly as the claim terms would reasonably allow, in light of the specification, when read by one skilled in the art with which the claimed invention is most closely connected. *MPEP* § 2111.

[3] An invention, as embodied in the claims, is rendered obvious if an examiner concludes that although the claimed invention is not identically disclosed or described in a reference, the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *MPEP* § 2141 (citing 35 U.S.C. § 103).

two sub-steps: (1) adducement of objective evidence teaching how to modify the prior art components to achieve the individual elements of the claim at issue; and (2) adducement of objective evidence teaching how to combine the modified individual components such that the claim at issue, as a whole, is achieved. *MPEP* § 2141; *MPEP* § 2143. Each of these forgoing elements is further defined within the MPEP. *Id.*

This requirement has been explained recently by the Supreme Court in *KSR v. Teleflex, 550 U.S. _____; 127 S. Ct. 1727 (2007)* which noted that such a rejection requires "some articulated reasoning … to support the legal conclusion of obviousness." As stated by the Court, obviousness can be established where "there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, ***this analysis should be made explicit***." (*emphasis added*) See In re Kahn, 441 F. 3d 977, 988 (CA Fed. 2006) ('[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.')." *KSR v. Teleflex, 550 U.S. _____; 127 S. Ct. 1727 at 1741.*

As further described by the Court ***"[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.*** Although common sense directs one to look with care at a patent application that claims as innovation the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *KSR v. Teleflex, 550 U.S. _____; 127 S. Ct. 1727 at 1741.*

a) Interpreting a Claim at Issue

With respect to interpreting a claim at issue, the MPEP directs that, during examination -- as opposed to subsequent to issue -- such claim be interpreted as broadly as the claim terms would reasonably allow when read by one skilled in the art with which

the claimed invention is most closely connected. In practice, this is achieved by giving each of the terms in the claim the "plain meaning" of the terms as such would be understood by those having ordinary skill in the art, and if portions of the claim have no "plain meaning" within the art, or are ambiguous as used in a claim, then the examiner is to consult the specification for clarification. *MPEP* § 2111.

b) Definition of One or More Prior Art Reference Components Relevant to the Claim at Issue

Once the claim at issue has been properly interpreted, the next step is the definition of one or more prior art reference components (*e.g.*, electrical, mechanical, or other components set forth in a prior art reference) relevant to the properly interpreted claim at issue. With respect to the definition of one or more prior art reference components relevant to the claim at issue, the MPEP defines three proper sources of such prior art reference components, with the further requirement that each such source must have been extant at the time of invention to be considered relevant. These three sources are as follows: patents as defined by 35 U.S.C. §102, printed publications as defined by 35 U.S.C. §102, and information (*e.g.*, scientific principles) deemed to be "well known in the art"[4] as defined under 35 U.S.C. §102. *MPEP* § 2141; *MPEP* § 2144.

[4] The fact that information deemed to be "well known in the art" can serve as a proper source of prior art reference components seems to open the door to subjectivity, but such is not the case. As a remedy to this potential problem, *MPEP* § 2144.03 states that if an examiner asserts that his position is derived from and/or is supported by a teaching or suggestion that is alleged to have been "well known in the art," and that if an applicant traverses such an assertion (that something was "well known within the art"), the examiner must cite a reference in support of his or her position. The same MPEP section also states that when a rejection is based on facts within the personal knowledge of an examiner, the data should be stated as specifically as possible, and the facts must be supported, when called for by the applicant, by an affidavit from the examiner. Such an affidavit is subject to contradiction or explanation by the affidavits of the applicant and other persons. *Id.* Thus, all sources of prior art reference components must be objectively verifiable.

c) Ascertainment of Differences between Prior Art Reference Components and Claim at Issue; Teaching to Modify and/or Combine Prior Art Reference Components to Remedy Those Differences in Order to Achieve Recitations of Claim at Issue

With one or more prior art components so defined and drawn from the proper prior art sources, the differences between the one or more prior art reference components and the elements of the claim at issue are to be ascertained. Thereafter, in order to establish a case of *prima facie* obviousness, an examiner must set forth a rationale, supported by objective evidence[5] sufficient to demonstrate under a preponderance of the evidence standard, that in the prior art extant at the time of invention there was a teaching to modify and/or combine the one or more prior art reference components to construct a device practicably equivalent to the claim at issue.

The preferable evidence relied upon is an express teaching to modify/combine within the properly defined objectively verifiable sources of prior art. In the absence of such express teaching, an examiner may attempt to establish a rationale to support a finding of such teaching reasoned from, or based upon, express teachings taken from the defined proper sources of such evidence (*i.e.*, properly defined objectively verifiable sources of prior art). *MPEP* § 2144; *In re Dembiczak*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999).

The MPEP recognizes the pitfalls associated with the tendency to subconsciously use impermissible "hindsight" when an examiner attempts to establish such a rationale. The MPEP has set forth at least two rules to ensure against the likelihood of such impermissible use of hindsight. The first rule is that:

> under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information,[6] the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at

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[5] The proper sources of the objective evidence supporting the rationale are the defined proper sources of prior art reference components, discussed above, with the addition of factually similar legal precedent. *MPEP* § 2144.

[6] "Factual information" is information actually existing or occurring, as distinguished from mere supposition or opinion. *Black's Law Dictionary* 532 (5th ed. 1979).

> that time to that person. Knowledge of an Applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search, and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon an Applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

MPEP § 2142 (emphasis added). Thus, if the only objective evidence of such teaching to modify and/or combine prior art reference components is an applicant's disclosure, no evidence of such teaching exists.[7]

The second rule is that if an examiner attempts to rely on some advantage or expected beneficial result that would have been produced by a modification and/or combination of the prior art reference components as evidence to support a rationale to establish such teachings to modify and/or combine prior art reference components, the MPEP requires that such advantage or expected beneficial result be objectively verifiable teachings present in the acceptable sources of prior art (or drawn from a convincing line of reasoning based on objectively verifiable established scientific principles or teachings). *MPEP* § 2144. Thus, as a guide to avoid the use of impermissible hindsight, these rules from the MPEP make clear that absent some objective evidence, sufficient to persuade under a preponderance of the evidence standard, no teaching of such modification and/or combination exists.[8]

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[7] An applicant may argue that an examiner's conclusion of obviousness is based on improper hindsight reasoning. However, "[a]ny judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, such a reconstruction is proper." *MPEP* § 2145(X)(A) (emphasis added).

[8] *In Re Sang Su Lee* 277 F.3d 1338 (Fed. Cir. 2002) ("When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness.") *See, e.g., McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52, 60 U.S.P.Q.2d 1001, 1008 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references," a question of fact drawing on the *Graham* factors). *"The factual inquiry whether to combine references must be thorough and searching." Id. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting *C.R. Bard, Inc., v. M3 Systems, Inc.*, 157 F.3d 1340, 1352, 48 U.S.P.Q.2d 1225, 1522 (Fed. Cir. 1998)); *In re Dembiczak*, 175 F.3d 994, 999,

B. Technical Material Cited by Examiner (Mulgund et al (US 2002/0161751 A1) and Madden et al "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks.") Does Not Show or Suggest the Text of Amended Independent Claim 1 and Dependent Claims 2-20, and 46-48 as Presented Herein; Notice of Allowance of Same Respectfully Requested

1. Independent Claim 1

Independent Claim 1 recites:

> 1. A method comprising:
> determining at least one of a **sensing function or a control function** at a first mote of a second mote; and
> creating one or more mote-addressed content indexes of the second mote at the first more in response to said determining. (emphasis added)

As shown in the following, the technical material cited by the Examiner does not show or suggest the text of Independent Claim 1. Accordingly, Applicant respectfully requests that Examiner allow Independent Claim 1.

a) Technical Material Cited by Examiner Does Not Show or Suggest the Text of at Least Amended Independent Claim 1.

As set forth above, Independent Claim 1 recites:

1. A method comprising:

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50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); *In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) ("'teachings of references can be combined only if there is some suggestion or incentive to do so.'") (emphasis in original) (quoting *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984)). The need for specificity pervades this authority. *See, e.g., In re Kotzab*, 217 F.3d 1365, 1371, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"); *In re Rouffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998) ("even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.")).

[a] determining at least one of a **sensing function or a control function** at a first mote of a second mote; and

[b] creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining.[9] (Emphases added.)

With respect to Claim 1, Examiner has stated,

"As to claim 1, Mulgund shows:

determining at least one of a sensing function or a control function of a second mote [discovering and maintaining the distributed sensor network topology (par. [0007]), wherein at least one of a sensing function or a control function is interpreted to be at least one of the data elements outlined in paragraphs 0021 - 0024]; and creating one or more mote-addressed content indexes of the second mote in response to said determining [building a database model by updating relational database logical design tables at each step of the discovering step (par. 0007)].

Mulgund also shows a sensor network modeling agent (summary of the invention) for performing the recited functions.

Mulgund does not show that said determining and creating is being performed at a first mote.

Madden shows:

determining at least one of a sensing function or a control function at a first mote [parent mote] of a second mote [child mote] [asking sensors to choose the group they belong to forward tagged partial state record with the group id] (section 4.2 Grouping); and

creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining [creating in-network aggregate of collected information across all groups] (section 4.2 Grouping).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having said determining and creating being performed at a first mote in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates)."

See Examiner's *Office Action*, p. 14-15 (13 February, 2009).

(1) Examiner Citations With Regard to Clause [a] of Independent Claim 1

[9] The lettering of the clauses herein is merely for sake of clarity of argument and should not be taken to imply any particular ordering of the clauses.

Applicant respectfully points out that Applicant has reviewed the portions of Mulgund and Madden identified by Examiner, and so far as Applicant can discern, Mulgund and Madden (either alone or in combination) do not recite or suggest the text of clause [a] of Applicant's Independent Claim 1. Rather, the portions of Mulgund cited by Examiner recites as follows:

> [0007] In another aspect, the present invention is a method of database modeling that makes it possible to create, store, and update a virtual model of a network of sensors within a relational database structure. The network modeling agent dynamically updates various sensor node data and link data that collectively define an instantaneous "state" of the sensor network into the database logical design. The network modeling agent thereby facilitates access, visualization, and the use of a stream of information generated by the network of distributed sensors. The sensor nodes to be interrogated by the network modeling agent are assumed to be uniquely addressable and in communication, using networking protocols, with one another through links and with a database server through one or more access points. A method according to the present invention comprises the steps of discovering and maintaining the distributed sensor network topology by applying at every access point a quasi-recursive algorithm, which causes the network modeling agent to visit a first sensor node and mark the first node visited, push the marked first node onto a stack, and while the stack is non-empty, query the node at the top of the stack for a list of current links to the node at the top, compare the list of current links to a list of historical links to the node at the top of the stack and update the historical link and historical node information, and if there are no unmarked nodes reachable from a current link then pop the stack, otherwise visit the next reachable unmarked node, mark the next node and push it onto the stack. The network modeling agent builds the database model by updating relational database logical design tables at each step of the discovering step. The agent maintains the database model by periodically reapplying the interrogating algorithm, thereby updating the database model to account for sensor node and link additions and deletions. The periodicity of updates is preferably such that a near real-time topology of the sensor network is maintained.

See *Mulgund* (paragraph 0007)

> [0021] an identity (unique identifying information such as a numeric address) of each of the sensing nodes 2 in the network 4, as well as any metadata about each node;
>
> [0022] a connectivity of each of the sensing nodes 2; i.e., a structural representation of the network topology that could be used to reconstruct a diagram such as FIG. 1;

[0023] an up-to-date information content at each of the sensing nodes 2; i.e., a real-time snapshot and time-history of the data of interest generated at each node location by an attached suite of sensors 16, as depicted in FIG. 2; and

[0024] a history of the network 4 from the moment the model was first constructed, which would allow a reconstruction of the network's state at any time in the past.

See *Mulgund* (paragraphs 21-24)

[0006] In one aspect, the present invention is an information architecture that permits the Internet to contact distributed sensors at one point, databases and mining engines at another point, and users at another point. In this aspect, the invention is an enabling interface between the Internet and the physical world. Due to the global reach of the Internet, these physical points of contact may be distributed anywhere in the world. The Applicants have invented a sensor network modeling agent for use with a relational database and a logical design resident therein.

[0007] In another aspect, the present invention is a method of database modeling that makes it possible to create, store, and update a virtual model of a network of sensors within a relational database structure. The network modeling agent dynamically updates various sensor node data and link data that collectively define an instantaneous "state" of the sensor network into the database logical design. The network modeling agent thereby facilitates access, visualization, and the use of a stream of information generated by the network of distributed sensors. The sensor nodes to be interrogated by the network modeling agent are assumed to be uniquely addressable and in communication, using networking protocols, with one another through links and with a database server through one or more access points. A method according to the present invention comprises the steps of discovering and maintaining the distributed sensor network topology by applying at every access point a quasi-recursive algorithm, which causes the network modeling agent to visit a first sensor node and mark the first node visited, push the marked first node onto a stack, and while the stack is non-empty, query the node at the top of the stack for a list of current links to the node at the top, compare the list of current links to a list of historical links to the node at the top of the stack and update the historical link and historical node information, and if there are no unmarked nodes reachable from a current link then pop the stack, otherwise visit the next reachable unmarked node, mark the next node and push it onto the stack. The network modeling agent builds the database model by updating relational database logical design tables at each step of the discovering step. The agent maintains the database model by periodically reapplying the interrogating algorithm, thereby updating the database model to account for sensor node and link additions and

deletions. The periodicity of updates is preferably such that a near real-time topology of the sensor network is maintained.

[0008] In another embodiment, the present invention is a method as described above, wherein the logical design tables further comprise a data table for mapping between one or more sensor nodes and the tables used to store the associated sensor output data associated with the one or more sensor nodes.

[0009] In certain embodiments, the present invention is used in modeling networks comprised of mobile sensor nodes. The sensor nodes may communicate by wired or wireless means. The database server used with the present invention may be remotely located from the distributed sensor network.

See *Mulgund* (Summary of the Invention)

The portions of *Madden* cited by Examiner recites as follows:

4.2 Grouping

Grouping in TAG is functionally equivalent to the GROUP BY clause in SQL: each sensor reading is placed into exactly one group, and groups are partitioned according to an expression over one or more attributes. The basic grouping technique is to push the expression down with the query, ask nodes to choose the group they belong to, and then, as answers flow back, update aggregate values in the appropriate groups.

Partial state records are aggregated just as in the approach described above, except that those records are now tagged with a group id. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function *f*. If it is in a different group, it stores the value of the child's group along with its own value for forwarding in the next epoch. If another child message arrives with a value in either group, the node updates the appropriate aggregate. During the next epoch, the node sends the value of all the groups about which it collected information during the previous epoch, combining information about multiple groups into a single message as long as message size permits. Figure 2 shows an example of computing a query grouped by temperature that selects average light readings.

Recall that queries may contain a HAVING clause, which constrains the set of groups in the final query result. This predicate can sometimes be passed into the network along with the grouping expression. The predicate is only sent if it can potentially be used to reduce the number of messages that must be sent: for example, if the predicate is of the form MAX(attr) <

> x, then information about groups with MAX(attr) ≥ x need not be transmitted up the tree, and so the predicate is sent down into the network. When a node detects that a group does not satisfy a HAVING clause, it can notify other nodes in the network of this information to suppress transmission and storage of values from that group. Note that HAVING clauses can be pushed down only for monotonic aggregates; nonmonotonic aggregates are not amenable to this technique. However, not all HAVING predicates on monotonic aggregates can be pushed down; for example, MAX(attr) > x cannot be applied in the network because a node cannot know that, just because its local value of *attr* is less than x, the MAX over the entire group is less than x.
>
> Grouping introduces an additional problem: the number of groups can exceed available storage on any one (nonleaf) device. Our proposed solution is to evict one or more groups from local storage. Once an eviction victim is selected, it is forwarded to the node's parent, which may choose to hold on to the group or continue to forward it up the tree. Notice that a single node may evict several groups in a single epoch (or the same group multiple times, if a bad victim is selected). This is because, once group storage is full, if only one group is evicted at a time, a new eviction decision must be made every time a value representing an unknown or previously evicted group arrives. Because groups can be evicted, the base station at the top of the network may be called upon to combine partial groups to form an accurate aggregate value. Evicting partially computed groups is known as *partial preaggregation*, as described in [15].
>
> Thus, we have shown how to partition sensor readings into a number of groups and properly compute aggregates over those groups, even when the amount of group information exceeds available storage in any one device. We will briefly mention experiments with grouping and group eviction policies in Section 5.2. First, we summarize some of the additional benefits of TAG.

See *Madden* (Section 4.2 Grouping)

As can be seen from the foregoing, the Examiner-identified portions of Mulgund and Madden do <u>*not recite*</u> the text of clause [a] as recited in Independent Claim 1. For example, Madden teaches "Partial state records are aggregated just as in the approach described above, except that those **records are now tagged with a group id**. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function f." (Emphasis added) See *Madden* (Section 4.2 Grouping)

Mulgund teaches "[0008] In another embodiment, the present invention is a method as described above, wherein the logical design tables further comprise a data table for mapping between one or more sensor nodes and the tables used to store the associated sensor output data associated with the one or more sensor nodes. [0009] In certain embodiments, the present invention is used in modeling networks comprised of mobile sensor nodes. The sensor nodes may communicate by wired or wireless means. The **database server used with the present invention** may be remotely located from the distributed sensor network." See *Mulgund* (Summary of the Invention) (Emphasis added) On the other hand, clause [a] recites "determining at least one of a **sensing function or a control function at a first mote** of a second mote;" (emphasis added). The cited text does not show or recite "*a sensing function or a control function at a first mote.*"

Applicant has reviewed the Examiner-cited portions of Madden and Mulgund and is unable to locate a recitation of clause [a] of Claim 1. Applicant further respectfully points out that the Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to why the text of the reference passages should be interpreted to teach clause [a] of amended Independent Claim 1.

Given that Applicant has shown, above, what Madden and Mulgund actually recite, the question thus naturally arises as to how Examiner saw Madden and Mulgund as "teaching" something related to Clause [a] of Independent Claim 1. Applicant respectfully points out that the Applicant's Application is the only objectively verifiable examiner-cited document of record that shows or suggests what Examiner purports the reference to teach. From this and the express recitations of Madden and Mulgund as set forth, it follows that Examiner is interpreting Madden through the lens of Applicant's application, which is impermissible hindsight use. Thus, at present, Examiner's assertions regarding Madden and Mulgund are untenable. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a prima facie case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 1 allowable and issue a Notice of Allowability of same.

In the alternative and/or in addition to the foregoing, as Examiner has provided no objectively verifiable evidence, nor argument based on objectively verifiable evidence, in

support of Examiner assertions regarding what the technical material cited by Examiner "teaches," Applicant infers that the Examiner is relying on "personal knowledge" and/or is taking "official notice" of one or more factors to reach the factual conclusion of what the cited technical material "teaches." In view of the foregoing, if Examiner desires to maintain the rejection, in the next communication, Applicant respectfully requests that the Examiner provide an affidavit or declaration setting forth objectively verifiable evidence in support of Examiner's currently unsupported assertions regarding what the cited technical material "teaches" and/or should be interpreted to "teach." *See, e.g.*, MPEP §2144.03(C), *If Applicant Challenges a Factual Assertion as Not Properly Officially Notices or Not Properly Based Upon Common Knowledge, the Examiner Must Support the Finding with Adequate Evidence*, and 37 C.F.R. 1.104(d)(2).

Applicant has shown by direct quotations that Independent Claim 1 and the Examiner-cited Mulgund and Madden reference are very different on their faces. *See supra* at pp. 24-25 (quotation of Claim 1); at pp. 26-28 (quotation of Mulgund) at pp. 28–29 (quotation of Madden). Insofar that Applicant has shown that *"at first sight; on the first appearance; on the face of it; so far as can be judged from the first disclosure"* the Examiner-cited art is very different from Claim 1, and Applicant has noted that Examiner has not cited to any objectively verifiable evidence/argument based on same sufficient to remedy such *prima facie* differences, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Claim 1 either under the MPEP or under controlling legal standards. *See supra* at pp. 17-23.

Accordingly, insofar as that Mulgund does not recite the text of at least Clauses [a] of Applicant's Independent Claim 1, and insofar as that Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to how Mulgund could be modified/combined to teach at least Clause [a] of Independent Claim 1, Applicant respectfully points out that under the MPEP guidelines as set forth above, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Independent Claim 1 for at least these reasons. Thus, Applicant respectfully asks Examiner to hold Independent Claim 1 allowable and to issue a Notice of Allowability of same.

With respect to Examiner assertions regarding the teachings of Mulgund, Applicant demonstrated above that the express recitations of Mulgund are not as Examiner alleges, and that Examiner has provided no evidence—let alone the preponderance of the evidence required—to support Examiner assertions as to the factual conclusion as to what Mulgund "teaches." Accordingly, Applicant respectfully points out that in view of the foregoing, Examiner has presented no evidence that Mulgund teaches as asserted by Examiner. In addition, Applicant respectfully points out that even if Examiner's assertions regarding the teachings of Mulgund were supported, such would be of no moment in that Examiner has yet to connect the alleged teaching of Mulgund to the actual express language of Applicant's Independent Claim 1. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a *prima facie* case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 1 allowable and issue a Notice of Allowability of same.

2. Dependent Claims 2-20: Patentable for at Least Reasons of Dependency from Independent Claim 1.

Claims 2-20 depend either directly or indirectly from Independent Claim 1. "A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers." *See* 35 U.S.C. §112 paragraph 4. Consequently, Dependent Claims 2-20 are patentable for at least the reasons why Independent Claim 1 is patentable. Accordingly, Applicant respectfully requests that Examiner hold Dependent Claims 2-20 patentable for at least the foregoing reasons, and issue a Notice of Allowance on same.

3. Dependent Claims 46-48: Patentable for at Least Reasons of Dependency from Independent Claim 1.

Applicant has added claims 46-48 and consideration of these claims is respectfully requested. Claims 46-48 depend either directly or indirectly from independent claim 1. "A claim in dependent form shall be construed to incorporate by

reference all the limitations of the claim to which it refers." *See* 35 U.S.C. §112 paragraph 4. Consequently, dependent claims 46-48 are patentable for at least the reasons why independent claim 1 is patentable. Accordingly, Applicant respectfully requests that Examiner hold new dependent claims 46-48 patentable for at least the foregoing reasons, and issue a Notice of Allowance on same.

C. Technical Material Cited by Examiner (Mulgund et al (US 2002/0161751 A1) and Madden et al "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks.") Does Not Show or Suggest the Text of Amended Independent Claim 21 and Dependent Claims 22-40, and 49-50 as Presented Herein; Notice of Allowance of Same Respectfully Requested

1. Independent Claim 21

Independent Claim 21 recites:

> 21. A system comprising:
> means, including a storage medium, for **determining at least one of a sensing function or a control function of a second mote at a first mote**; and
> an index creation agent including means for creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining, wherein at least one of the means for determining or the means for creating includes hardware for at least one of determining or creating. (emphasis added)

As shown in the following, the technical material cited by the Examiner does not show or suggest the text of Independent Claim 21. Accordingly, Applicant respectfully requests that Examiner allow Independent Claim 21.

a) Technical Material Cited by Examiner Does Not Show or Suggest the Text of at Least Independent Claim 21.

As set forth above, Independent Claim 21 recites:

21. A system comprising:

[a] means, including a storage medium, for **determining at least one of a sensing function or a control function of a second mote at a first mote**; and

[b] an index creation agent including means for creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining, wherein at least one of the means for determining or the means for creating includes hardware for at least one of determining or creating. (Emphases added.)

With respect to Claim 21, Examiner has stated,

"As to claim 21, Mulgund inherently shows:

means for determining at least one of a sensing function or a control function of a second mote [discovering and maintaining the distributed sensor network topology (par. [0007]), wherein at least one of a sensing function or a control function is interpreted to be at least one of the data elements outlined in paragraphs 0021 - 0024]; and

means for creating one or more mote-addressed content indexes of the second mote in response to said determining [building a database model by updating relational database logical design tables at each step of the discovering step (par. 0007)], wherein at least one of the means for determining or means for creating includes electrical circuitry for at least one of determining or creating (par. [0026]).

Mulgund also shows a sensor network modeling agent (summary of the invention) for performing the recited functions.

Mulgund does not show that said determining and creating is being performed at a first mote.

Madden inherently shows:

means for determining at least one of a sensing function or a control function at a first mote [parent mote] of a second mote [child mote] [asking sensors to choose the group they belong to forward tagged partial state record with the group id] (section 4.2 Grouping); and

means for creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining [creating in-network aggregate of collected information across all groups] (section 4.2 Grouping), wherein at least one of the means for determining or means for creating includes electrical circuitry for at least one of determining or creating (section 2 Motes and Ad-Hoc Networks).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Mulgund by having said determining and creating being performed at a first mote in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates).

See Examiner's *Office Action*, p. 17-18 (13 February, 2009).

(1) Examiner Citations With Regard to Clause [a] of Independent Claim 21

Applicant respectfully points out that Applicant has reviewed the portions of Mulgund and Madden identified by Examiner, and so far as Applicant can discern, Mulgund and Madden do not recite the text of clause [a] of Applicant's Independent Claim 21. Rather, the portions of Mulgund cited by Examiner recites as follows:

> [0007] In another aspect, the present invention is a method of database modeling that makes it possible to create, store, and update a virtual model of a network of sensors within a relational database structure. The network modeling agent dynamically updates various sensor node data and link data that collectively define an instantaneous "state" of the sensor network into the database logical design. The network modeling agent thereby facilitates access, visualization, and the use of a stream of information generated by the network of distributed sensors. The sensor nodes to be interrogated by the network modeling agent are assumed to be uniquely addressable and in communication, using networking protocols, with one another through links and with a database server through one or more access points. A method according to the present invention comprises the steps of discovering and maintaining the distributed sensor network topology by applying at every access point a quasi-recursive algorithm, which causes the network modeling agent to visit a first sensor node and mark the first node visited, push the marked first node onto a stack, and while the stack is non-empty, query the node at the top of the stack for a list of current links to the node at the top, compare the list of current links to a list of historical links to the node at the top of the stack and update the historical link and historical node information, and if there are no unmarked nodes reachable from a current link then pop the stack, otherwise visit the next reachable unmarked node, mark the next node and push it onto the stack. The network modeling agent builds the database model by updating relational database logical design tables at each step of the discovering step. The agent maintains the database model by periodically reapplying the interrogating algorithm, thereby updating the database model to account for sensor node and link additions and deletions. The periodicity of updates is preferably such that a near real-time topology of the sensor network is maintained.

See *Mulgund* (paragraph 0007)

> [0021] an identity (unique identifying information such as a numeric address) of each of the sensing nodes 2 in the network 4, as well as any metadata about each node;

[0022] a connectivity of each of the sensing nodes 2; i.e., a structural representation of the network topology that could be used to reconstruct a diagram such as FIG. 1;

[0023] an up-to-date information content at each of the sensing nodes 2; i.e., a real-time snapshot and time-history of the data of interest generated at each node location by an attached suite of sensors 16, as depicted in FIG. 2; and

[0024] a history of the network 4 from the moment the model was first constructed, which would allow a reconstruction of the network's state at any time in the past.

See *Mulgund* (paragraphs 0021-0024)

[0026] FIG. 2 illustrates the nature of each of the sensing nodes 2, which comprise computational devices (possibly ranging in complexity from small embedded platforms to a fully-fledged PCs) that have one or more sensors 16 providing high-value information connected to it. The term sensor is used here in a general sense. A sensor 16 as contemplated herein could be as simple as an instrument that measures temperature, pressure, or any such other physical quantity. It could also be a device as complex as a video camera providing continuous full-motion imagery of some area of interest. In any case, the output of each of these sensors 16 is stored locally in a well-defined knowledge base 18, but the output can be accessed from outside the network 4 through some software application programming interface (API) and hardware implementation. Each of the sensing nodes 2 is additionally in communication with one or more other sensing nodes through connecting links 3.

See *Mulgund* (paragraph 0026)

[0006] In one aspect, the present invention is an information architecture that permits the Internet to contact distributed sensors at one point, databases and mining engines at another point, and users at another point. In this aspect, the invention is an enabling interface between the Internet and the physical world. Due to the global reach of the Internet, these physical points of contact may be distributed anywhere in the world. The Applicants have invented a sensor network modeling agent for use with a relational database and a logical design resident therein.

[0007] In another aspect, the present invention is a method of database modeling that makes it possible to create, store, and update a virtual model of a network of sensors within a relational database structure. The network modeling agent dynamically updates various sensor node data and link data that collectively define an instantaneous "state" of the sensor network into the database logical design. The network modeling agent thereby facilitates access, visualization, and the use of a stream of information

generated by the network of distributed sensors. The sensor nodes to be interrogated by the network modeling agent are assumed to be uniquely addressable and in communication, using networking protocols, with one another through links and with a database server through one or more access points. A method according to the present invention comprises the steps of discovering and maintaining the distributed sensor network topology by applying at every access point a quasi-recursive algorithm, which causes the network modeling agent to visit a first sensor node and mark the first node visited, push the marked first node onto a stack, and while the stack is non-empty, query the node at the top of the stack for a list of current links to the node at the top, compare the list of current links to a list of historical links to the node at the top of the stack and update the historical link and historical node information, and if there are no unmarked nodes reachable from a current link then pop the stack, otherwise visit the next reachable unmarked node, mark the next node and push it onto the stack. The network modeling agent builds the database model by updating relational database logical design tables at each step of the discovering step. The agent maintains the database model by periodically reapplying the interrogating algorithm, thereby updating the database model to account for sensor node and link additions and deletions. The periodicity of updates is preferably such that a near real-time topology of the sensor network is maintained.

[0008] In another embodiment, the present invention is a method as described above, wherein the logical design tables further comprise a data table for mapping between one or more sensor nodes and the tables used to store the associated sensor output data associated with the one or more sensor nodes.

[0009] In certain embodiments, the present invention is used in modeling networks comprised of mobile sensor nodes. The sensor nodes may communicate by wired or wireless means. The database server used with the present invention may be remotely located from the distributed sensor network.

See *Mulgund* (Summary of the Invention)

The portions of *Madden* cited by Examiner recites as follows:

4.2 Grouping

Grouping in TAG is functionally equivalent to the GROUP BY clause in SQL: each sensor reading is placed into exactly one group, and groups are partitioned according to an expression over one or more attributes. The basic grouping technique is to push the expression down with the query, ask nodes to choose the group they belong to, and then, as answers flow back, update aggregate values in the appropriate groups.

Partial state records are aggregated just as in the approach described above, except that those records are now tagged with a group id. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function *f*. If it is in a different group, it stores the value of the child's group along with its own value for forwarding in the next epoch. If another child message arrives with a value in either group, the node updates the appropriate aggregate. During the next epoch, the node sends the value of all the groups about which it collected information during the previous epoch, combining information about multiple groups into a single message as long as message size permits. Figure 2 shows an example of computing a query grouped by temperature that selects average light readings.

Recall that queries may contain a HAVING clause, which constrains the set of groups in the final query result. This predicate can sometimes be passed into the network along with the grouping expression. The predicate is only sent if it can potentially be used to reduce the number of messages that must be sent: for example, if the predicate is of the form MAX(attr) < x, then information about groups with MAX(attr) ≥ x need not be transmitted up the tree, and so the predicate is sent down into the network. When a node detects that a group does not satisfy a HAVING clause, it can notify other nodes in the network of this information to suppress transmission and storage of values from that group. Note that HAVING clauses can be pushed down only for monotonic aggregates; nonmonotonic aggregates are not amenable to this technique. However, not all HAVING predicates on monotonic aggregates can be pushed down; for example, MAX(attr) > x cannot be applied in the network because a node cannot know that, just because its local value of *attr* is less than x, the MAX over the entire group is less than x.

Grouping introduces an additional problem: the number of groups can exceed available storage on any one (nonleaf) device. Our proposed solution is to evict one or more groups from local storage. Once an eviction victim is selected, it is forwarded to the node's parent, which may choose to hold on to the group or continue to forward it up the tree. Notice that a single node may evict several groups in a single epoch (or the same group multiple times, if a bad victim is selected). This is because, once group storage is full, if only one group is evicted at a time, a new eviction decision must be made every time a value representing an unknown or previously evicted group arrives. Because groups can be evicted, the base station at the top of the network may be called upon to combine partial groups to form an accurate aggregate value. Evicting partially computed groups is known as *partial preaggregation*, as described in [15].

Thus, we have shown how to partition sensor readings into a number of groups and properly compute aggregates over those groups, even when the amount of group information exceeds available storage in any one device.

We will briefly mention experiments with grouping and group eviction policies in Section 5.2. First, we summarize some of the additional benefits of TAG.

See *Madden* (Section 4.2 Grouping)

2 Motes and Ad-Hoc Networks

In this section, we provide a brief overview of the mote hardware architecture, the TinyOS system, and an ad hoc routing algorithm for mote-based sensor networks.

See *Madden* (Section 2 Motes and Ad-Hoc Networks)

4 In Network Aggregates

Given the simple routing protocol from Section 2.2 and our query model, we now discuss the implementation of the core TAG algorithm for in network aggregation.

A naive implementation of sensor network aggregation would be to use a centralized, server-based approach where all sensor readings are sent to the base station, which then computes the aggregates. In TAG, however, we compute aggregates in network whenever possible, because, if properly implemented, this approach can be lower in number of message transmissions, latency, and power consumption than the server-based approach. We will measure the advantage of in network aggregation in Section 5 below; first, we present the basic algorithm in detail. We first consider the operation of the basic approach in the absence of grouping; we show how to extend it with grouping in Section 4.2.

See *Madden* (Section 4 In Network Aggregates)

As can be seen from the foregoing, the Examiner-identified portions of Mulgund and Madden do *not recite* the text of clause [a] as recited in Independent Claim 21. For example, Mulgund teaches "**The network modeling agent builds the database model by updating relational database logical design tables at each step of the discovering step.** The agent maintains the database model by periodically reapplying the interrogating algorithm, thereby updating the database model to account for sensor node and link additions and deletions. The periodicity of updates is preferably such that a near real-time topology of the sensor network is maintained." (Emphasis added) Madden teaches "Partial state records are aggregated just as in the approach described above, except that those **records are now tagged with a group id**. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a

child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function f." (Emphasis added) See Madden (Section 4.2 Grouping) On the other hand, clause [a] recites "means, including a storage medium, for **determining at least one of a sensing function or a control function of a second mote at a first mote**;" (emphasis added). The cited text does not show or recite "*determining at least one of a sensing function or a control function of a second mote at a first mote.*"

Applicant has reviewed the Examiner-cited portions of Madden and is unable to locate a recitation of clause [a] of Claim 21. Applicant further respectfully points out that the Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to why the text of the reference passages should be interpreted to teach clause [a] of amended Independent Claim 21.

Given that Applicant has shown, above, what Madden actually recites, the question thus naturally arises as to how Examiner saw Madden as "teaching" something related to Clause [a] of Independent Claim 21. Applicant respectfully points out that the Applicant's Application is the only objectively verifiable examiner-cited document of record that shows or suggests what Examiner purports the reference to teach. From this and the express recitations of Madden as set forth, it follows that Examiner is interpreting Madden through the lens of Applicant's application, which is impermissible hindsight use. Thus, at present, Examiner's assertions regarding Madden are untenable. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a prima facie case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 21 allowable and issue a Notice of Allowability of same.

In the alternative and/or in addition to the foregoing, as Examiner has provided no objectively verifiable evidence, nor argument based on objectively verifiable evidence, in support of Examiner assertions regarding what the technical material cited by Examiner "teaches," Applicant infers that the Examiner is relying on "personal knowledge" and/or is taking "official notice" of one or more factors to reach the factual conclusion of what the cited technical material "teaches." In view of the foregoing, if Examiner desires to maintain the rejection, in the next communication, Applicant respectfully requests that the Examiner provide an affidavit or declaration setting forth objectively verifiable

evidence in support of Examiner's currently unsupported assertions regarding what the cited technical material "teaches" and/or should be interpreted to "teach." *See, e.g.*, MPEP §2144.03(C), *If Applicant Challenges a Factual Assertion as Not Properly Officially Notices or Not Properly Based Upon Common Knowledge, the Examiner Must Support the Finding with Adequate Evidence*, and 37 C.F.R. 1.104(d)(2).

Applicant has shown by direct quotations that Independent Claim 21 and the Examiner-cited Mulgund and Madden references are very different on their faces. *See supra* at pp. 33-34 (quotation of Claim 21); at pp. 35-37 (quotation of Mulgund) at pp. 37–39 (quotation of Madden). Insofar that Applicant has shown that *"at first sight; on the first appearance; on the face of it; so far as can be judged from the first disclosure"* the Examiner-cited art is very different from Claim 21, and Applicant has noted that Examiner has not cited to any objectively verifiable evidence/argument based on same sufficient to remedy such *prima facie* differences, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Claim 21 either under the MPEP or under controlling legal standards. *See supra* at pp. 17-23.

Accordingly, insofar as that Mulgund does not recite the text of at least Clauses [a] of Applicant's Independent Claim 21, and insofar as that Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to how Mulgund could be modified/combined with Madden to teach at least Clause [a] of Independent Claim 21, Applicant respectfully points out that under the MPEP guidelines as set forth above, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Independent Claim 21 for at least these reasons. Thus, Applicant respectfully asks Examiner to hold Independent Claim 21 allowable and to issue a Notice of Allowability of same.

With respect to Examiner assertions regarding the teachings of Mulgund, Applicant demonstrated above that the express recitations of Mulgund are not as Examiner alleges, and that Examiner has provided no evidence—let alone the preponderance of the evidence required—to support Examiner assertions as to the factual conclusion as to what Mulgund "teaches." Accordingly, Applicant respectfully points out that in view of the foregoing, Examiner has presented no evidence that Mulgund teaches

as asserted by Examiner. In addition, Applicant respectfully points out that even if Examiner's assertions regarding the teachings of Mulgund were supported, such would be of no moment in that Examiner has yet to connect the alleged teaching of Mulgund to the actual express language of Applicant's Independent Claim 21. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a *prima facie* case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 21 allowable and issue a Notice of Allowability of same.

2. Dependent Claims 22-40: Patentable for at Least Reasons of Dependency from Independent Claim 21.

Claims 22-40 depend either directly or indirectly from Independent Claim 21. "A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers." *See* 35 U.S.C. §112 paragraph 4. Consequently, Dependent Claims 22-40 are patentable for at least the reasons why Independent Claim 21 is patentable. Accordingly, Applicant respectfully requests that Examiner hold Dependent Claims 22-40 patentable for at least the foregoing reasons, and issue a Notice of Allowance on same.

3. Dependent Claim 35 in Independently Patentable

Irrespective of the arguments discussed above, Claim 35 is independently patentable.

Amended Dependent Claim 35 recites:

> The system of Claim 21, wherein said means for creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining further comprises:
>
> [a] means for determining a mote-network address of the second mote;
>
> [b] means for determining one or more types of sensing available from one or more devices of the second mote; and
>
> [c] means for associating **at the first mote in the one or more mote-addressed content indexes** the one or more types of sensing available from one

or more devices of the second mote with the mote-network address of the second mote. (Emphasis added)

With respect to claim 35, Examiner has stated,

> "As to claims 14, 15, 34, and 35, Mulgund in view of Madden shows:
> determining a mote-network address of the second mote (paragraphs [0021] and [0028] – [0031] in Mulgund);
> determining one or more types of control and sensing available from one or more devices at the second mote (paragraphs [0021] - [0024] in Mulgund) wherein the following data elements are obtained by interrogating a node (par. [0044] in Mulgund); and
> associating the one or more types of control or sensing available from one or more devices at the second mote with the mote-network address of the second mote (Fig. 3 and par. [0037] in Mulgund)."
>
> *See* Examiner's *Office Action*, p. 16-17 (13 February, 2009).

Applicant respectfully points out that Applicant has reviewed the Madden reference identified by Examiner, and so far as Applicant can discern, Madden does not recite "means, including a storage medium, for **determining at least one of a sensing function or a control function of a second mote at a first mote;**" as recited in Independent Claim 21 (parent claim). (Emphasis added) Instead, Madden recites Madden teaches "Partial state records are aggregated just as in the approach described above, except that those **records are now tagged with a group id**. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function f." (Emphasis added) See Madden (Section 4.2 Grouping). Consequently, on its face, Madden does not show the text of at least Clause [a] of Independent Claim 21.

As can be seen from the foregoing, the Examiner-identified portions of Mulgund and Madden do *not recite* the text as recited in dependent claim 35. For example, Mulgund teaches "it is assumed that the software agent on the database server can interrogate the node to determine what type of information it provides, and then define the table structures accordingly." (Mulgund paragraph [0042]) (Emphasis added) On the

other hand, dependent claim 35 recites "means for associating **at the first mote in the one or more mote-addressed content indexes** the one or more types of sensing available from one or more devices of the second mote with the mote-network address of the second mote." (emphasis added). The cited text does not show or recite "*at the first mote in the one or more mote-addressed content indexes.*"

Applicant has reviewed the Examiner-cited portions of Mulgund and Madden and is unable to locate a recitation of claim 35. Applicant further respectfully points out that the Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to why the text of the reference passages should be interpreted to teach amended dependent claim 35.

> Instead, Mulgund recites:
> [0021] an identity (unique identifying information such as a numeric address) of each of the sensing nodes 2 in the network 4, as well as any metadata about each node;
>
> [0022] a connectivity of each of the sensing nodes 2; i.e., a structural representation of the network topology that could be used to reconstruct a diagram such as FIG. 1;
>
> [0023] an up-to-date information content at each of the sensing nodes 2; i.e., a real-time snapshot and time-history of the data of interest generated at each node location by an attached suite of sensors 16, as depicted in FIG. 2; and
>
> [0024] a history of the network 4 from the moment the model was first constructed, which would allow a reconstruction of the network's state at any time in the past.

See *Mulgund* (paragraphs 0021-0024)

> [0028] each node is addressable from the outside world or from other nodes;
>
> [0029] the structure and nature of the sensor(s) output data is known a priori or it can be retrieved by interrogating the node with which the sensor(s) are associated,
>
> [0030] each node contains some local memory or other knowledge base 18 for recording sensor output data, which can be retrieved by interrogating the node;

[0031] each node uses networking protocols that allow it to communicate with its neighboring nodes in the ad hoc sensor network (again, it is of no import how the sensor network came into being, how its connectivity is specified, or how nodes find one another); and

See *Mulgund* (paragraphs 0028-0031)

[0044] to build the database representation of the sensor network 4 described above, the NMA 14 employs a means to traverse the network in order to interrogate each node. The NMA 14 employs a quasi-recursive algorithm that is run on the database server 10 to build and maintain the database network model. The NMA 14 is a software agent resident on the database server 10 and written in any compatible computer language, whose responsibility is to build and update this model. As discussed earlier, it is assumed that there exists some software API that allows the NMA 14 to access each node on the network, which is reached via one or more access points 6 that can be reached via Internet protocols from the database server 10.

See *Mulgund* (paragraph 44)

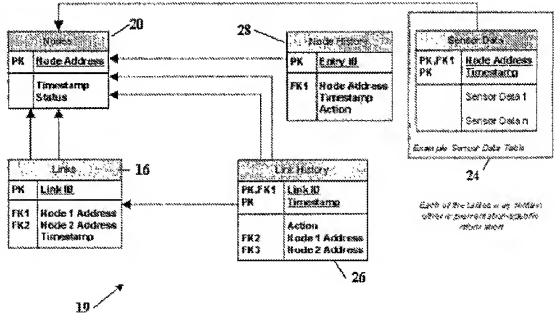


Figure 3

See *Mulgund* (Figure 3)

[0037] The Nodes Table 20 maintains a list of all known sensor nodes 2 in the network 4. Each node is identified by a unique Node Address, which is a primary key for the Nodes Table 20. The Nodes Table also contains a Status field, which is used to indicate whether a node is known to be

> active. This field is used for marking nodes that have disappeared from the network (which could later reappear). At present, it is anticipated that this Status variable will take on one of just a small set of mutually exclusive values that indicate whether or not the associated node continues to be an active, reachable member of the network 4. Finally, the Nodes Table 20 contains a Timestamp field that indicates when the Status information was last updated. When a node disappears from the network for whatever reason, the corresponding entry in the Nodes Table 20 is not deleted; it is marked as unreachable. The reason for doing so is explained below.

See *Mulgund* (paragraph [0037])

Given that Applicant has shown, above, what Mulgund actually recites, the question thus naturally arises as to how Examiner saw Mulgund and Madden as "teaching" something related dependent claim 35. Applicant respectfully points out that the Applicant's Application is the only objectively verifiable examiner-cited document of record that shows or suggests what Examiner purports the reference to teach. From this and the express recitations of Mulgund and Madden as set forth, it follows that Examiner is interpreting Mulgund and Madden through the lens of Applicant's application, which is impermissible hindsight use. Thus, at present, Examiner's assertions regarding Mulgund and Madden are untenable. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a prima facie case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold dependent Claim 35 allowable and issue a Notice of Allowability of same.

In the alternative and/or in addition to the foregoing, as Examiner has provided no objectively verifiable evidence, nor argument based on objectively verifiable evidence, in support of Examiner assertions regarding what the technical material cited by Examiner "teaches," Applicant infers that the Examiner is relying on "personal knowledge" and/or is taking "official notice" of one or more factors to reach the factual conclusion of what the cited technical material "teaches." In view of the foregoing, if Examiner desires to maintain the rejection, in the next communication, Applicant respectfully requests that the Examiner provide an affidavit or declaration setting forth objectively verifiable evidence in support of Examiner's currently unsupported assertions regarding what the cited technical material "teaches" and/or should be interpreted to "teach." *See, e.g.*, MPEP §2144.03(C), *If Applicant Challenges a Factual Assertion as Not Properly*

Officially Notices or Not Properly Based Upon Common Knowledge, the Examiner Must Support the Finding with Adequate Evidence, and 37 C.F.R. 1.104(d)(2).

Applicant has shown by direct quotations that Independent Claim 35 and its parent claim, and the Examiner-cited Mulgund and Madden references are very different on their faces. *See supra* at p. 33-34 (quotation of Claim 21); p. 42 (quotation of Claim 35); at pp. 37-39 (quotation of Madden); and at pp. 44-46 (quotation of Mulgund). Insofar that Applicant has shown that *"at first sight; on the first appearance; on the face of it; so far as can be judged from the first disclosure"* the Examiner-cited art is very different from Claim 35, and Applicant has noted that Examiner has not cited to any objectively verifiable evidence/argument based on same sufficient to remedy such *prima facie* differences, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Claim 35 or its parent claim either under the MPEP or under controlling legal standards. *See supra* at pp. 17-23.

Accordingly, insofar as that Mulgund does not recite the text of at least Clauses [a] of Applicant's Independent Claim 35, and insofar as that Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to how Mulgund could be modified/combined with Madden to teach at least Clause [a] of Independent Claim 35, Applicant respectfully points out that under the MPEP guidelines as set forth above, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Independent Claim 35 for at least these reasons. Thus, Applicant respectfully asks Examiner to hold Independent Claim 35 allowable and to issue a Notice of Allowability of same.

With respect to Examiner assertions regarding the teachings of Mulgund, Applicant demonstrated above that the express recitations of Mulgund are not as Examiner alleges, and that Examiner has provided no evidence—let alone the preponderance of the evidence required—to support Examiner assertions as to the factual conclusion as to what Mulgund "teaches." Accordingly, Applicant respectfully points out that in view of the foregoing, Examiner has presented no evidence that Mulgund teaches as asserted by Examiner. In addition, Applicant respectfully points out that even if Examiner's assertions regarding the teachings of Mulgund were supported, such would

be of no moment in that Examiner has yet to connect the alleged teaching of Mulgund to the actual express language of Applicant's Independent Claim 35. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a *prima facie* case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 35 allowable and issue a Notice of Allowability of same.

4. Dependent Claims 49-50: Patentable for at Least Reasons of Dependency from Independent Claim 21.

Applicant has added claims 49-50 and consideration of these claims is respectfully requested. Claims 49-50 depend either directly or indirectly from independent claim 1. "A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers." *See* 35 U.S.C. §112 paragraph 4. Consequently, dependent claims 49-50 are patentable for at least the reasons why independent claim 1 is patentable. Accordingly, Applicant respectfully requests that Examiner hold new dependent claims 49-50 patentable for at least the foregoing reasons, and issue a Notice of Allowance on same.

D. Technical Material Cited by Examiner (Mulgund et. al. (U.S. Pub. No. 2002/0161751) and Madden et. al. "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks") Does Not Show or Suggest the Text of Amended Independent Claim 41 and Dependent claims 42-44 as Presented Herein; Notice of Allowance of Same Respectfully Requested

1. Amended Independent Claim 41

Amended Independent Claim 41 recites:

41. A system comprising:

a first mote;

at least one mote-appropriate device at a second mote; and

at least one index creation agent resident in the first mote, said at least one index creation agent configured to **create at least one of a sensing index, a**

control index, or a routing/spatial index associated with the second mote. (emphasis added)

As shown in the following, the technical material cited by the Examiner does not show or suggest the text of Independent Claim 41. Accordingly, Applicant respectfully requests that Examiner allow Independent Claim 41.

a) Technical Material Cited by Examiner Does Not Show or Suggest the Text of at Least Amended Independent Claim 41.

As set forth above, Independent Claim 41 recites:

41. A system comprising:

[a] a first mote;

[b] at least one mote-appropriate device at a second mote; and

[c] at least one index creation agent resident in the first mote, said at least one index creation agent configured to **create at least one of a sensing index, a control index, or a routing/spatial index associated with the second mote**. (emphasis added)

With respect to Claim 41, Examiner has stated,

> "As to claim 41, Mulgund shows:
> a first mote [node 2] (Fig. 1);
> at least one mote-appropriate device [sensor 16] at a second mote [another node 2] (Fig. 2 and par. [0026]); and
> at least one index creation agent [a sensor network modeling agent], said at least one index creation agent configured to create at least one of a sensing index, a control index, or a routing/spatial index associated with the second mote (Fig. 3 and par. [0037]).
> Mulgund also shows that each node contains some local memory or other knowledge base for recording sensor output data, which can be retrieved by interrogating the node (par. [0030]), which suggests that there exists some agent resident in a mote that collects data from sensors and stores it in the local knowledge base, however, the local agent per se is not explicitly shown.
> Madden shows:

at least one index creation agent [generic aggregation service for ad hoc networks of TinyOS motes] resident in the first mote [parent mote], said at least one index creation agent configured to create at least one of a sensing index [group id index] associated with the second mote [child mote] [creating in-network aggregate of collected information across all groups] (section 4.2 Grouping).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having said at least one index creation agent being resident in the first mote in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates)."

See Examiner's *Office Action*, p. 18-19 (13 February, 2009).

(1) Examiner Citations With Regard to Clause [c] of Independent Claim 41

Applicant respectfully points out that Applicant has reviewed the portions of Mulgund identified by Examiner, and so far as Applicant can discern, Mulgund does not recite the text of clause [c] of Applicant's Independent Claim 41. Rather, the portions of Mulgund cited by Examiner recites as follows:

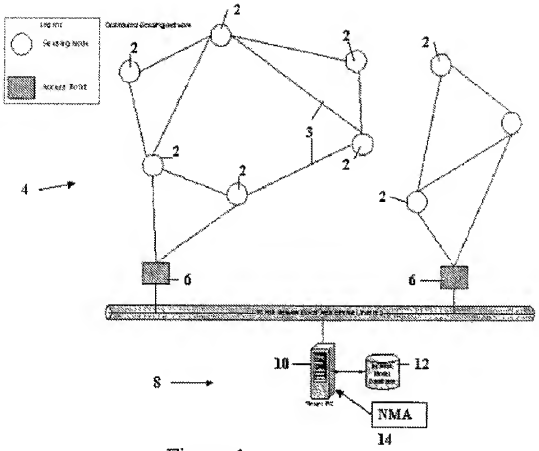
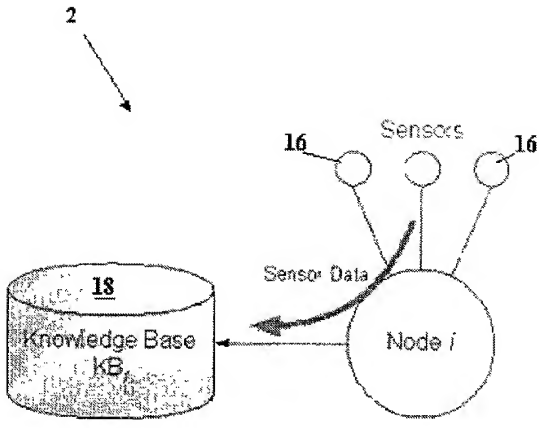


Figure 1

See *Mulgund* (Figure 1)



See *Mulgund* (Figure 2)

[0026] FIG. 2 illustrates the nature of each of the sensing nodes 2, which comprise computational devices (possibly ranging in complexity from small embedded platforms to a fully-fledged PCs) that have one or more sensors 16 providing high-value information connected to it. The term sensor is used here in a general sense. A sensor 16 as contemplated herein could be as simple as an instrument that measures temperature, pressure, or any such other physical quantity. It could also be a device as complex as a video camera providing continuous full-motion imagery of some area of interest. In any case, the output of each of these sensors 16 is stored locally in a well-defined knowledge base 18, but the output can be accessed from outside the network 4 through some software application programming interface (API) and hardware implementation. Each of the sensing nodes 2 is additionally in communication with one or more other sensing nodes through connecting links 3.

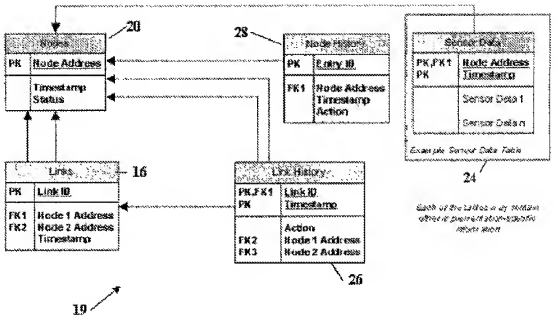


Figure 3

See *Mulgund* (Figure 3)

> [0037] The Nodes Table 20 maintains a list of all known sensor nodes 2 in the network 4. Each node is identified by a unique Node Address, which is a primary key for the Nodes Table 20. The Nodes Table also contains a Status field, which is used to indicate whether a node is known to be active. This field is used for marking nodes that have disappeared from the network (which could later reappear). At present, it is anticipated that this Status variable will take on one of just a small set of mutually exclusive values that indicate whether or not the associated node continues to be an active, reachable member of the network 4. Finally, the Nodes Table 20 contains a Timestamp field that indicates when the Status information was last updated. When a node disappears from the network for whatever reason, the corresponding entry in the Nodes Table 20 is not deleted; it is marked as unreachable. The reason for doing so is explained below.

See *Mulgund* (paragraph 0037)

> [0030] each node contains some local memory or other knowledge base 18 for recording sensor output data, which can be retrieved by interrogating the node;

See *Mulgund* (paragraph 0030)

The portions of *Madden* cited by Examiner recites as follows:

> **4.2 Grouping**

Grouping in TAG is functionally equivalent to the GROUP BY clause in SQL: each sensor reading is placed into exactly one group, and groups are partitioned according to an expression over one or more attributes. The basic grouping technique is to push the expression down with the query, ask nodes to choose the group they belong to, and then, as answers flow back, update aggregate values in the appropriate groups.

Partial state records are aggregated just as in the approach described above, except that those records are now tagged with a group id. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function *f*. If it is in a different group, it stores the value of the child's group along with its own value for forwarding in the next epoch. If another child message arrives with a value in either group, the node updates the appropriate aggregate. During the next epoch, the node sends the value of all the groups about which it collected information during the previous epoch, combining information about multiple groups into a single message as long as message size permits. Figure 2 shows an example of computing a query grouped by temperature that selects average light readings.

Recall that queries may contain a HAVING clause, which constrains the set of groups in the final query result. This predicate can sometimes be passed into the network along with the grouping expression. The predicate is only sent if it can potentially be used to reduce the number of messages that must be sent: for example, if the predicate is of the form MAX(attr) < x, then information about groups with MAX(attr) ≥ x need not be transmitted up the tree, and so the predicate is sent down into the network. When a node detects that a group does not satisfy a HAVING clause, it can notify other nodes in the network of this information to suppress transmission and storage of values from that group. Note that HAVING clauses can be pushed down only for monotonic aggregates; nonmonotonic aggregates are not amenable to this technique. However, not all HAVING predicates on monotonic aggregates can be pushed down; for example, MAX(attr) > x cannot be applied in the network because a node cannot know that, just because its local value of *attr* is less than x, the MAX over the entire group is less than x.

Grouping introduces an additional problem: the number of groups can exceed available storage on any one (nonleaf) device. Our proposed solution is to evict one or more groups from local storage. Once an eviction victim is selected, it is forwarded to the node's parent, which may choose to hold on to the group or continue to forward it up the tree. Notice that a single node may evict several groups in a single epoch (or the same group multiple times, if a bad victim is selected). This is because, once group storage is full, if only one group is evicted at a time, a new eviction decision must be made every time a value representing an unknown or previously evicted group arrives. Because groups can be evicted, the base

station at the top of the network may be called upon to combine partial groups to form an accurate aggregate value. Evicting partially computed groups is known as *partial preaggregation*, as described in [15].

Thus, we have shown how to partition sensor readings into a number of groups and properly compute aggregates over those groups, even when the amount of group information exceeds available storage in any one device. We will briefly mention experiments with grouping and group eviction policies in Section 5.2. First, we summarize some of the additional benefits of TAG.

See *Madden* (Section 4.2 Grouping)

4 In Network Aggregates

Given the simple routing protocol from Section 2.2 and our query model, we now discuss the implementation of the core TAG algorithm for in network aggregation.

A naive implementation of sensor network aggregation would be to use a centralized, server-based approach where all sensor readings are sent to the base station, which then computes the aggregates. In TAG, however, we compute aggregates in network whenever possible, because, if properly implemented, this approach can be lower in number of message transmissions, latency, and power consumption than the server-based approach. We will measure the advantage of in network aggregation in Section 5 below; first, we present the basic algorithm in detail. We first consider the operation of the basic approach in the absence of grouping; we show how to extend it with grouping in Section 4.2.

See *Madden* (Section 4 In Network Aggregates)

As can be seen from the foregoing, the Examiner-identified portions of Mulgund and Madden do *not recite* the text of clause [c] as recited in Independent Claim 41. For example, Mulgund teaches "The database server used with the present invention may be remotely located from the distributed sensor network." (Emphasis added) Madden teaches "Partial state records are aggregated just as in the approach described above, except that those **records are now tagged with a group id**. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function f." (Emphasis added) See Madden (Section 4.2 Grouping)

On the other hand, clause [c] recites "at least one index creation agent resident in the first mote, said at least one index creation agent configured to **create at least one of a**

sensing index, a control index, or a routing/spatial index associated with the second mote." (emphasis added). The cited text does not show or recite "*create at least one of a sensing index, a control index, or a routing/spatial index associated with the second mote.*"

Applicant has reviewed the Examiner-cited portions of Mulgund and is unable to locate a recitation of clause [c] of Claim 41. Applicant further respectfully points out that the Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to why the text of the reference passages should be interpreted to teach clause [c] of amended Independent Claim 41.

Given that Applicant has shown, above, what Mulgund actually recites, the question thus naturally arises as to how Examiner saw Mulgund as "teaching" something related to Clause [c] of Independent Claim 41. Applicant respectfully points out that the Applicant's Application is the only objectively verifiable examiner-cited document of record that shows or suggests what Examiner purports the reference to teach. From this and the express recitations of Mulgund as set forth, it follows that Examiner is interpreting Mulgund through the lens of Applicant's application, which is impermissible hindsight use. Thus, at present, Examiner's assertions regarding Mulgund are untenable. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a prima facie case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 41 allowable and issue a Notice of Allowability of same.

In the alternative and/or in addition to the foregoing, as Examiner has provided no objectively verifiable evidence, nor argument based on objectively verifiable evidence, in support of Examiner assertions regarding what the technical material cited by Examiner "teaches," Applicant infers that the Examiner is relying on "personal knowledge" and/or is taking "official notice" of one or more factors to reach the factual conclusion of what the cited technical material "teaches." In view of the foregoing, if Examiner desires to maintain the rejection, in the next communication, Applicant respectfully requests that the Examiner provide an affidavit or declaration setting forth objectively verifiable evidence in support of Examiner's currently unsupported assertions regarding what the cited technical material "teaches" and/or should be interpreted to "teach." *See, e.g.,*

MPEP §2144.03(C), *If Applicant Challenges a Factual Assertion as Not Properly Officially Notices or Not Properly Based Upon Common Knowledge, the Examiner Must Support the Finding with Adequate Evidence*, and 37 C.F.R. 1.104(d)(2).

Applicant has shown by direct quotations that Independent Claim 41 and the Examiner-cited Mulgund and Madden references are very different on their faces. *See supra* at pp. 48-49 (quotation of Claim 41); at pp. 50-53 (quotation of Mulgund) at pp. 53–55 (quotation of Madden). Insofar that Applicant has shown that *"at first sight; on the first appearance; on the face of it; so far as can be judged from the first disclosure"* the Examiner-cited art is very different from Claim 41, and Applicant has noted that Examiner has not cited to any objectively verifiable evidence/argument based on same sufficient to remedy such *prima facie* differences, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Claim 41 either under the MPEP or under controlling legal standards. *See supra* at pp. 17-23.

Accordingly, insofar as that Mulgund does not recite the text of at least Clauses [a] of Applicant's Independent Claim 41, and insofar as that Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to how Mulgund could be modified/combined with Madden to teach at least Clause [a] of Independent Claim 41, Applicant respectfully points out that under the MPEP guidelines as set forth above, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Independent Claim 41 for at least these reasons. Thus, Applicant respectfully asks Examiner to hold Independent Claim 41 allowable and to issue a Notice of Allowability of same.

With respect to Examiner assertions regarding the teachings of Mulgund, Applicant demonstrated above that the express recitations of Mulgund are not as Examiner alleges, and that Examiner has provided no evidence—let alone the preponderance of the evidence required—to support Examiner assertions as to the factual conclusion as to what Mulgund "teaches." Accordingly, Applicant respectfully points out that in view of the foregoing, Examiner has presented no evidence that Mulgund teaches as asserted by Examiner. In addition, Applicant respectfully points out that even if Examiner's assertions regarding the teachings of Mulgund were supported, such would

be of no moment in that Examiner has yet to connect the alleged teaching of Mulgund to the actual express language of Applicant's Independent Claim 41. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a *prima facie* case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 41 allowable and issue a Notice of Allowability of same.

2. Dependent Claims 42-44: Patentable for at Least Reasons of Dependency from Independent Claim 41.

Claims 42-44 depend either directly or indirectly from Independent Claim 1. "A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers." *See* 35 U.S.C. §112 paragraph 4. Consequently, Dependent Claims 42-44 are patentable for at least the reasons why Independent Claim 41 is patentable. Accordingly, Applicant respectfully requests that Examiner hold Dependent Claims 42-44 patentable for at least the foregoing reasons, and issue a Notice of Allowance on same.

E. Technical Material Cited by Examiner (Mulgund et. al. (U.S. Pub. No. 2002/0161751) and Madden et. al. "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks") Does Not Show or Suggest the Text of Amended Independent Claim 45 as Presented Herein; Notice of Allowance of Same Respectfully Requested

1. Amended Independent Claim 45

Amended Independent Claim 45 recites:

45. A system comprising:

a first mote;

at least one mote-appropriate device at a second mote; and

a mote-addressed content **index at the first mote having at least one of a sensing function, a control function, or routing/spatial information** of said at least one mote-appropriate device at the second mote. (emphasis added)

As shown in the following, the technical material cited by the Examiner does not show or suggest the text of Independent Claim 45. Accordingly, Applicant respectfully requests that Examiner allow Independent Claim 45.

a) Technical Material Cited by Examiner Does Not Show or Suggest the Text of at Least Amended Independent Claim 45.

As set forth above, Independent Claim 45 recites:

"45. A system comprising:

[a] a first mote;

[b] at least one mote-appropriate device at a second mote; and

[c] a mote-addressed content **index at the first mote having at least one of a sensing function, a control function, or routing/spatial information** of said at least one mote-appropriate device at the second mote." (emphasis added)

With respect to Claim 45, Examiner has stated,

> "As to claim 45, Mulgund shows:
> a first mote [node 2] (Fig. 1);
> at least one mote-appropriate device [sensor 16] at a second mote [another node 2] (Fig. 2 and par. [0026]); and
> a mote-addressed content index having at least a sensing function of said atleast one mote-appropriate device at the second mote (Fig. 3 par. [0037]).
> Mulgund does not show that said mote-addressed content index is at the firstmote.
> Madden shows:
> a mote-addressed content index at the first mote [parent mote] having at least a sensing function [group id] of said at least one mote-appropriate device at the second mote [child mote] [creating in-network aggregate of collected information across all groups] (section 4.2 Grouping).
> It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having said mote-addressed content index being at the first mote in order to lower the number of message transmissions, latency, and power consumption than

the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates)."

See Examiner's *Office Action*, p. 20-21 (13 February, 2009).

(1) Examiner Citations With Regard to Clause [c] of Independent Claim 45

Applicant respectfully points out that Applicant has reviewed the portions of Mulgund identified by Examiner, and so far as Applicant can discern, Mulgund does not recite the text of clause [c] of Applicant's Independent Claim 45. Rather, the portions of Mulgund cited by Examiner recites as follows:

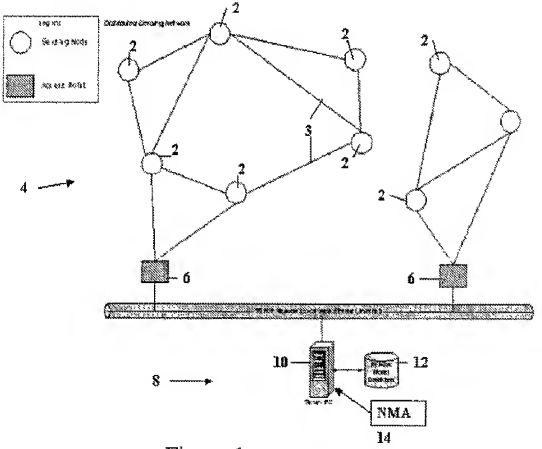
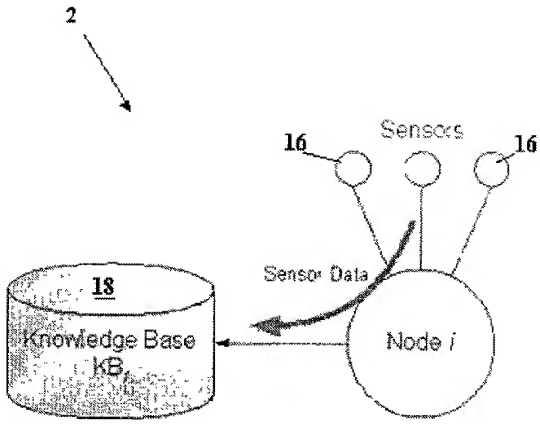


Figure 1

See *Mulgund* (Figure 1)



See *Mulgind* (Figure 2)

[0026] FIG. 2 illustrates the nature of each of the sensing nodes 2, which comprise computational devices (possibly ranging in complexity from small embedded platforms to a fully-fledged PCs) that have one or more sensors 16 providing high-value information connected to it. The term sensor is used here in a general sense. A sensor 16 as contemplated herein could be as simple as an instrument that measures temperature, pressure, or any such other physical quantity. It could also be a device as complex as a video camera providing continuous full-motion imagery of some area of interest. In any case, the output of each of these sensors 16 is stored locally in a well-defined knowledge base 18, but the output can be accessed from outside the network 4 through some software application programming interface (API) and hardware implementation. Each of the sensing nodes 2 is additionally in communication with one or more other sensing nodes through connecting links 3.

See *Mulgund* (paragraph 0026)

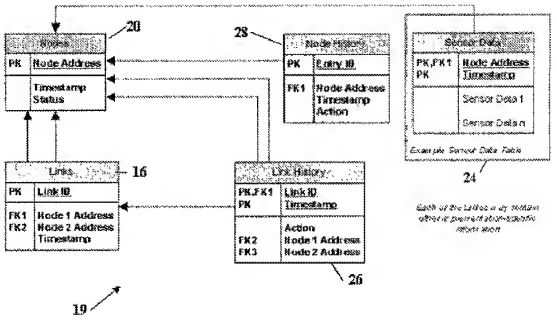


Figure 3

See *Mulgund* (Figure 3)

[0037] The Nodes Table 20 maintains a list of all known sensor nodes 2 in the network 4. Each node is identified by a unique Node Address, which is a primary key for the Nodes Table 20. The Nodes Table also contains a Status field, which is used to indicate whether a node is known to be active. This field is used for marking nodes that have disappeared from the network (which could later reappear). At present, it is anticipated that this Status variable will take on one of just a small set of mutually exclusive values that indicate whether or not the associated node continues to be an active, reachable member of the network 4. Finally, the Nodes Table 20 contains a Timestamp field that indicates when the Status information was last updated. When a node disappears from the network for whatever reason, the corresponding entry in the Nodes Table 20 is not deleted; it is marked as unreachable. The reason for doing so is explained below.

See *Mulgund* (paragraph 0037)

4.2 Grouping

Grouping in TAG is functionally equivalent to the GROUP BY clause in SQL: each sensor reading is placed into exactly one group, and groups are partitioned according to an expression over one or more attributes. The basic grouping technique is to push the expression down with the query, ask nodes to choose the group they belong to, and then, as answers flow back, update aggregate values in the appropriate groups.

Partial state records are aggregated just as in the approach described above, except that those records are now tagged with a group id. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function *f*. If it is in a different group, it stores the value of the child's group along with its own value for forwarding in the next epoch. If another child message arrives with a value in either group, the node updates the appropriate aggregate. During the next epoch, the node sends the value of all the groups about which it collected information during the previous epoch, combining information about multiple groups into a single message as long as message size permits. Figure 2 shows an example of computing a query grouped by temperature that selects average light readings.

Recall that queries may contain a HAVING clause, which constrains the set of groups in the final query result. This predicate can sometimes be passed into the network along with the grouping expression. The predicate is only sent if it can potentially be used to reduce the number of messages that must be sent: for example, if the predicate is of the form MAX(attr) < x, then information about groups with MAX(attr) ≥ x need not be transmitted up the tree, and so the predicate is sent down into the network. When a node detects that a group does not satisfy a HAVING clause, it can notify other nodes in the network of this information to suppress transmission and storage of values from that group. Note that HAVING clauses can be pushed down only for monotonic aggregates; nonmonotonic aggregates are not amenable to this technique. However, not all HAVING predicates on monotonic aggregates can be pushed down; for example, MAX(attr) > x cannot be applied in the network because a node cannot know that, just because its local value of *attr* is less than x, the MAX over the entire group is less than x.

Grouping introduces an additional problem: the number of groups can exceed available storage on any one (nonleaf) device. Our proposed solution is to evict one or more groups from local storage. Once an eviction victim is selected, it is forwarded to the node's parent, which may choose to hold on to the group or continue to forward it up the tree. Notice that a single node may evict several groups in a single epoch (or the same group multiple times, if a bad victim is selected). This is because, once group storage is full, if only one group is evicted at a time, a new eviction decision must be made every time a value representing an unknown or previously evicted group arrives. Because groups can be evicted, the base station at the top of the network may be called upon to combine partial groups to form an accurate aggregate value. Evicting partially computed groups is known as *partial preaggregation*, as described in [15].

Thus, we have shown how to partition sensor readings into a number of groups and properly compute aggregates over those groups, even when the amount of group information exceeds available storage in any one device.

We will briefly mention experiments with grouping and group eviction policies in Section 5.2. First, we summarize some of the additional benefits of TAG.

See *Madden* (Section 4.2 Grouping)

4 In Network Aggregates

Given the simple routing protocol from Section 2.2 and our query model, we now discuss the implementation of the core TAG algorithm for in network aggregation.

A naive implementation of sensor network aggregation would be to use a centralized, server-based approach where all sensor readings are sent to the base station, which then computes the aggregates. In TAG, however, we compute aggregates in network whenever possible, because, if properly implemented, this approach can be lower in number of message transmissions, latency, and power consumption than the server-based approach. We will measure the advantage of in network aggregation in Section 5 below; first, we present the basic algorithm in detail. We first consider the operation of the basic approach in the absence of grouping; we show how to extend it with grouping in Section 4.2.

See *Madden* (Section 4 In Network Aggregates)

As can be seen from the foregoing, the Examiner-identified portions of Mulgund do *not recite* the text of clause [c] as recited in Independent Claim 45. For example, Mulgund teaches "The database server used with the present invention may be remotely located from the distributed sensor network." (Emphasis added) Madden teaches "Partial state records are aggregated just as in the approach described above, except that those **records are now tagged with a group id**. When a node is a leaf, it applies the grouping expression to compute a group id. It then tags its partial state record with the group and forwards it on to its parent. When a node receives an aggregate from a child, it checks the group id. If the child is in the same group as the node, it combines the two values using the combining function f." (Emphasis added) See Madden (Section 4.2 Grouping)

On the other hand, clause [c] recites "a mote-addressed content **index at the first mote having at least one of a sensing function, a control function, or routing/spatial information** of said at least one mote-appropriate device at the second mote." (emphasis added). The cited text does not show or recite "*index at the first mote having at least one of a sensing function, a control function, or routing/spatial information.*"

Applicant has reviewed the Examiner-cited portions of Mulgund and is unable to locate a recitation of clause [c] of Claim 45. Applicant further respectfully points out that the Examiner has provided no objectively verifiable evidence, or argument based on

objectively verifiable evidence, as to why the text of the reference passages should be interpreted to teach clause [c] of amended Independent Claim 45.

Given that Applicant has shown, above, what Mulgund actually recites, the question thus naturally arises as to how Examiner saw Mulgund as "teaching" something related to Clause [c] of Independent Claim 45. Applicant respectfully points out that the Applicant's Application is the only objectively verifiable examiner-cited document of record that shows or suggests what Examiner purports the reference to teach. From this and the express recitations of Mulgund as set forth, it follows that Examiner is interpreting Mulgund through the lens of Applicant's application, which is impermissible hindsight use. Thus, at present, Examiner's assertions regarding Mulgund are untenable. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a prima facie case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 45 allowable and issue a Notice of Allowability of same.

In the alternative and/or in addition to the foregoing, as Examiner has provided no objectively verifiable evidence, nor argument based on objectively verifiable evidence, in support of Examiner assertions regarding what the technical material cited by Examiner "teaches," Applicant infers that the Examiner is relying on "personal knowledge" and/or is taking "official notice" of one or more factors to reach the factual conclusion of what the cited technical material "teaches." In view of the foregoing, if Examiner desires to maintain the rejection, in the next communication, Applicant respectfully requests that the Examiner provide an affidavit or declaration setting forth objectively verifiable evidence in support of Examiner's currently unsupported assertions regarding what the cited technical material "teaches" and/or should be interpreted to "teach." *See, e.g.*, MPEP §2144.03(C), *If Applicant Challenges a Factual Assertion as Not Properly Officially Notices or Not Properly Based Upon Common Knowledge, the Examiner Must Support the Finding with Adequate Evidence*, and 37 C.F.R. 1.104(d)(2).

Applicant has shown by direct quotations that Independent Claim 45 and the Examiner-cited Mulgund and Madden references are very different on their faces. *See supra* at pp. 58-59 (quotation of Claim 45); at pp. 60-62 (quotation of Mulgund) at pp. 62–64 (quotation of Madden). Insofar that Applicant has shown that *"at first sight; on*

the first appearance; on the face of it; so far as can be judged from the first disclosure" the Examiner-cited art is very different from Claim 45, and Applicant has noted that Examiner has not cited to any objectively verifiable evidence/argument based on same sufficient to remedy such *prima facie* differences, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Claim 45 either under the MPEP or under controlling legal standards. *See supra* at pp. 17-23.

Accordingly, insofar as that Mulgund does not recite the text of at least Clauses [a] of Applicant's Independent Claim 45, and insofar as that Examiner has provided no objectively verifiable evidence, or argument based on objectively verifiable evidence, as to how Mulgund could be modified/combined with Madden to teach at least Clause [a] of Independent Claim 45, Applicant respectfully points out that under the MPEP guidelines as set forth above, the Examiner-cited technical material does not a establish a *prima facie* case of the unpatentability of Independent Claim 45 for at least these reasons. Thus, Applicant respectfully asks Examiner to hold Independent Claim 45 allowable and to issue a Notice of Allowability of same.

With respect to Examiner assertions regarding the teachings of Mulgund, Applicant demonstrated above that the express recitations of Mulgund are not as Examiner alleges, and that Examiner has provided no evidence—let alone the preponderance of the evidence required—to support Examiner assertions as to the factual conclusion as to what Mulgund "teaches." Accordingly, Applicant respectfully points out that in view of the foregoing, Examiner has presented no evidence that Mulgund teaches as asserted by Examiner. In addition, Applicant respectfully points out that even if Examiner's assertions regarding the teachings of Mulgund were supported, such would be of no moment in that Examiner has yet to connect the alleged teaching of Mulgund to the actual express language of Applicant's Independent Claim 45. Under the MPEP guidelines as set forth above, the cited art of record fails to establish a *prima facie* case of unpatentability for at least these reasons. Accordingly, for at least the foregoing reasons, Applicant respectfully requests that Examiner hold Independent Claim 45 allowable and issue a Notice of Allowability of same.

IV. REJECTION ARGUMENT: THE OFFICE ACTION ERRED IN REJECTING CLAIMS 21-40 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH

The Office action, at page 14-15, recites, "Claims 21-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement." Applicant respectfully traverses the rejections of claims 21-40.

Amended Claim 21 recites:

"21. A system comprising:

means, including a storage medium, for determining at least one of a sensing function or a control function of a second mote at a first mote; and

index creation agent including means for creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining, wherein at least one of the means for determining or the means for creating includes hardware for at least one of determining or creating." (Emphasis added)

The Office action at page 9-10, paragraph 7, recites:

". . . claim 21 appears to be a single means claim, i.e., where a means recitation does not appear in combination with another recited element of means, and is, therefore subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph."

The Office action at page 10-11, paragraph 8, recites:

". . . the amended independent claim 21 recites in part "wherein at least one of the means for determining or the means for creating includes electrical circuitry for at least one of determining or creating". The cited page 40 of the specification provides a very generic description of "electrical circuitry" and how "those skilled in the art will recognize that the various aspects described herein which can be implemented, individually and/or collectively, by a wide range of hardware, software, firmware, or any combination thereof can be viewed as being composed of various types of "electrical circuitry..."

Applicant has amended claim 21 to include one "means" recitation and an index creation agent that may be performed by different structures. Applicant has also amended claim 21 to include "hardware" which is supported by at least page 40 of the specification. Therefore, application requests withdrawal of the rejection and reconsideration and allowance of claim 21.

Claims 22-40 are dependent on claim 21. For reasons analogous to those stated above, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 22-40.

V. REJECTION ARGUMENT: THE OFFICE ACTION ERRED IN REJECTING CLAIMS 12-13, 21-40, 32-33 AND 43 UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

The Examiner rejected claims 12-13, 21-40, 32-33 and 43 under 35 USC §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically the office action states:

> " As to claims 12 and 13 (and corresponding claims 32 and 33), the step of establishing an index-creating agent at the mote in response to said step of determining is ambiguous because the order of steps is unclear to the extent that it is inconsistent with the order provided in the specification. In particular, independent claim 1 (and independent claim 21) states that step of creating is performed after (in response to) step of determining. The body of the claim further limits the step of creating by introducing additional steps (establishing, determining, and associating). However, the step of establishing an index-creating agent at the mote in response to the step of determining is inconsistent with the specification. The specification shows at the bottom of page 9 and the top of page 10 that " .. .index creation agent communicates with the device entities to find out what sensing functions are present and/or available at their various respectively associated devices ... " Thus, the specification identifies an index creating agent as performing the step of determining (recited in claims 1 and 21). In light of the specification, one of ordinary skill in the art would reasonably conclude that an index-creating agent is established prior to the step of determining in order for it to perform the step of determining. Therefore, the step of establishing an index-creating agent at the mote subsequently (in response to) step of determining, as currently claimed, is inconsistent with the specification and is, therefore, ambiguous.

Claim 13 contains analogous inconsistency wherein the step of migrating to the mote is claimed to be performed in response to the step of determining (recited in claims 1 and 21).

If applicants assert that the index creation agent does not perform the step of determining (of claims 1 and 21), as identified by examiner, the appropriate citation from the specification must be provided in the next response clearly indicating which component of the invention performs the recited step of determining.

As to claim 21, limitations: "means for determining" and "means for creating" are interpreted to invoke 35 USC 112, sixth paragraph.

The current specification must be reviewed to assist in identifying the corresponding structure that performs the claimed function. The specification shows that determining at least one of a sensing function or a control function at a mote and creating one or more mote-addressed content indexes in response to said determining is performed by an index creation agent (202) (bottom of page 9, page 10). Therefore, means for determining are interpreted to be an index creation agent (202), and means for creating are also interpreted to be an index creation agent (202).

Since the index creation agent is a computer program, as evidenced by specification at page 8 last paragraph, it is unclear how can a computer program include electrical circuitry, as currently claimed. In their arguments, applicants failed to either rebut presumption that 35 U.S.C. 112, sixth paragraph applies or explain why the particular structure identified by examiner is not the correct structure identified by "means" in the claimed "mean-plus-function" language. Thus, the rejection is deemed proper.

Claims 22-40 are rejected for the same reasons as these claims depend from rejected claim 21.

As to claim 43, an index creation agent is interpreted by the Examiner as a software program in at least one implementation, in light of the specification at last paragraph of page 8. In one such implementation of the index creation agent being a software program, it is unclear how a software program may comprise a processor, which is a hardware component."

Applicant has amended claims 12-13, and 32-33 by removing "in response to said determining." Therefore, the offices rejection of claims 12-13, and 32-33 are moot.

Applicant thus requests withdrawal of the rejections and allowance of claims 12–13 and 32-33.

Applicant has amended claim 21 to recite "an index creation agent including means for creating one or more mote-addressed content indexes of the second mote at the first mote in response to said determining, wherein at least one of the means for determining or the means for creating includes hardware for at least one of determining or creating." Therefore, the offices rejection of claim 21 and dependent claims 22-40 are moot. Applicant thus requests withdrawal of the rejections and allowance of claims 12–13 and 32-33.

In addition, the Examiner states "As to claim 43, an index creation agent is interpreted by the Examiner as a software program, in light of the specification at last paragraph of page 8. It is unclear how a software program may comprise a processor, which is a hardware component." Applicant respectfully submits that it is improper to interpret the term "index creation agent" as being limited to a software program as the Examiner suggests.

For example, at the last paragraph of page 8 (the portion of Applicant's specification cited by the Examiner), Applicant's specification states "In one implementation, index creation agent 202 is a computer program[.]" By this statement, Applicant clearly contemplates that in other implementations, index creation agent 202 is not a computer program.

Similarly, at the last paragraph on page 39 (paragraph [0106] of the published application), Applicant's specification further states:

> The foregoing detailed description has set forth various embodiments of the devices and/or processes via the use of block diagrams, flowcharts, and/or examples. Insofar as such block diagrams, flowcharts, and/or examples contain one or more functions and/or operations, it will be understood as notorious by those within the art that each function and/or operation within such block diagrams, flowcharts, or examples can be implemented, individually and/or collectively, by a wide range of hardware, software, firmware, or virtually any combination thereof. In one embodiment, several portions of the subject matter subject matter described herein may be implemented via Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays

> (FPGAs), digital signal processors (DSPs), or other integrated formats. However, those skilled in the art will recognize that some aspects of the embodiments disclosed herein, in whole or in part, can be equivalently implemented in standard integrated circuits, as one or more computer programs running on one or more computers (e.g., as one or more programs running on one or more computer systems), as one or more programs running on one or more processors (e.g., as one or more programs running on one or more microprocessors), as firmware, or as virtually any combination thereof, and that designing the circuitry and/or writing the code for the software and or firmware would be well within the skill of one of skill in the art in light of this disclosure.

Thus, in view of Applicant's specification (including original claim 43), Applicant respectfully submits that the "index creation agent" may not properly be viewed as being limited to a software program as the Examiner suggests. Claim 43 is merely one exemplary implementation that demonstrates that Applicant's specification contemplates that an "index creation agent" may comprise hardware (*e.g.* a processor). Based on Applicant's specification, may other implementations of an index creation agent that include hardware may be conceived and claimed (e.g. comprising ASICs, FPGAs, DSPs, etc). Therefore, Applicant respectfully requests reconsideration and withdrawal of the Examiner's rejections on grounds that "It is unclear how a software program may comprise a processor, which is a hardware component."

For the foregoing reasons, Applicant respectfully requests reconsideration and withdrawal of the rejections of claims 12-13, 21-40, 32-33 and 43 under 35 USC §112, second paragraph.

VI. OBJECTION TO THE APPLICATION

In the Office Action mailed February 13, 2009, the Examiner objected to the specification on grounds that it contains disclosure outside the bounds of the claims and that the specification failed "to provide a clear support or antecedent basis in the description for amended claims". Examiner's *Office Action*, p. 8-9 (February 13, 2009). Applicant respectfully requests that this objection continue to be held in abeyance until the prosecution of the claims has determined the extent of the allowable subject matter.

Applicant has also amended the claims so that the specification provides clear support or an antecedent basis in the description for the amended claims. Therefore, Applicant requests withdrawal of the objection.

VII. CONCLUSION

Applicant may have during the course of prosecution cancelled and/or amended one or more claims. Applicant notes that any such cancellations and/or amendments will have transpired (i) prior to issuance and (ii) in the context of the rules that govern claim interpretation during prosecution before the United States Patent and Trademark Office (USPTO). Applicant notes that the rules that govern claim interpretation during prosecution form a radically different context than the rules that govern claim interpretation subsequent to a patent issuing. Accordingly, Applicant respectfully submits that any cancellations and/or amendments during the course of prosecution should be held to be tangential to and/or unrelated to patentability in the event that such cancellations and/or amendments are viewed in a post-issuance context under post-issuance claim interpretation rules.

Insofar as that the Applicant may have during the course of prosecution cancelled/amended/argued claims sufficient to obtain a Notice of Allowability of all claims pending, Applicant may not have during the course of prosecution explicitly addressed all rejections and/or statements in Examiner's Office Actions. The fact that rejections and/or statements may not be explicitly addressed during the course of prosecution should NOT be taken as an admission of any sort, and Applicant hereby reserves any and all rights to contest such rejections and/or statements at a later time. Specifically, no waiver (legal, factual, or otherwise), implicit or explicit, is hereby intended (e.g., with respect to any facts of which Examiner took Official Notice, and/or for which Examiner has supplied no objective showing, Applicant hereby contests those facts and requests express documentary proof of such facts at such time at which such facts may become relevant). For example, although not expressly set forth during the course of prosecution, Applicant continues to assert all points of (e.g. caused by, resulting from, responsive to, etc.) any previous Office Action, and no waiver (legal, factual, or

otherwise), implicit or explicit, is hereby intended. Specifically, insofar as that Applicant does not consider the cancelled/unamended claims to be unpatentable, Applicant hereby gives notice that it may intend to file and/or has filed a continuing application in order prosecute such cancelled/unamended claims.

With respect to any cancelled claims, such cancelled claims were and continue to be a part of the original and/or present patent application(s). Applicant hereby reserves all rights to present any cancelled claim or claims for examination at a later time in this or another application. Applicant hereby gives public notice that any cancelled claims are still to be considered as present in all related patent application(s) (e.g. the original and/or present patent application) for all appropriate purposes (e.g., written description and/or enablement). Applicant does NOT intend to dedicate the subject matter of any cancelled claims to the public.

The Examiner is invited to contact Steven Stewart (206) 321-9072 or Dale R. Cook at (425) 467-2260 with any issues that may advance prosecution of the application on the merits.

Respectfully submitted,

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